EXHIBIT V

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

COREPHOTONICS, LTD.,
Patent Owner.

Case No. IPR2020-00897
U.S. Patent No. 10,324,277

DECLARATION OF TOM D. MILSTER, Ph.D. PURSUANT TO 37 C.F.R. § 1.68

TABLE OF CONTENTS

- McGuire Jr, J. P., & Kuper, T. G. (2012, October). Approaching direct optimization of as-built lens performance. In Novel Optical Systems Design and Optimization XV (Vol. 8487, p. 84870D). International Society for Optics and Photonics. (Ex. 2006)

- Sturlesi, D., & O'Shea, D. C. (1991). Global view of optical design space. Optical engineering, 30(2), 207-218. (Ex. 2007)

- Symmons and Schaub, *Field Guide to Molded Optics* (2016) (Ex. 2008)

- Declaration of Dr. Milster in IPR2020-00897 (Ex. 2009)

5. In forming the opinions set forth herein, I have considered:

a. The documents listed above;

b. My education, knowledge, skills, and experience in the design and development of imaging systems; and

c. The level of skill of a person having ordinary skill in the art (POSITA) at the time of the effective filing dates of the ’277 patent.

6. As I explain in further detail below, it is my professional and expert opinion that Apple and Dr. Sasián have failed to demonstrate that any of the challenged claims of the ‘277 patent were obvious, under any of the grounds or combinations of references that Apple has raised in this IPR.

III. EDUCATIONAL AND EMPLOYMENT BACKGROUND

7. I received a Bachelor of Science degree in Electrical Engineering from the University of Missouri in 1981 and a Doctorate in Optical Sciences from

the University of Arizona in 1987. I worked for IBM as a staff optical engineer from 1986 to 1989, and I worked during the summer of 1989 for Lawrence Livermore National Laboratories. I joined the faculty at the University of Arizona's Wyant College of Optical Sciences in 1989.

8. For forty years, I have been working, teaching, or researching in the field of optical devices. I worked for IBM for three years on the subject of optical storage developing miniature optical systems, and I have been teaching and researching at the University of Arizona for over thirty-one years.

9. I have written over one hundred peer-reviewed papers in the field of optics. A number of these papers relate specifically to miniature optical devices and systems. My technical research has earned several recognitions and awards. For example, my 1995 paper entitled "Linear behavior of a near-field optical scanning system" was selected as a landmark paper in near-field optics.[1] My 1997 paper entitled "Objective lens design for multiple-layer optical data storage" was selected as one of the 300 most influential papers in lens

[1] Kann, J.L., Milster, T.D., Froehlich, F.F. Ziolkowski, R.W., & Judkins, J.B. (1995). Linear behavior of a near-field optical scanning system. *JOSA A*, 12(8), 1677-1682.

design.[2] A recent paper entitled "Multiple-order diffractive engineered surface lenses" has been on the Applied Optics 'Top Downloads' list for the last four consecutive months.[3]

10. I am a named inventor on fifteen US patents concerning various advanced optical systems, like data detectors and systems for optical data storage that include miniature optics (US 4,823,220, US 6,111,839, US 6,577,584, US 6,577,584, US 7,796,487, US 7,974,170, US 8,003,187), miniature lens designs for fiber communications (US 6,498,875), vacuum ultraviolet systems (US 7,916,291, US 8,472,111, US 9,081,193), miniature-optic blood sensors (9,072,473), near-field sensors (US 8,737,178), and holography (US 9,116,303, US 10,866,406).

11. I have contributed chapters to eleven books about optics, including one chapter entitled "Miniature and Micro Optics," which has been published in the last three editions of the Handbook of Optics. This chapter discusses the design and use of miniature optical elements, including molded elements, that

[2] Milster, T. D., Upton, R. S., & Luo, H. (1997, July). Objective lens design for multiple-layer optical data storage. In Optical Data Storage 1997 Topical Meeting (Vol. 3109, pp. 142-149). International Society for Optics and Photonics.

[3] Milster, T.D., Kim, Y.S., Wang, Z., & Purvin, K. (2020). Multiple-order diffractive engineered surface lenses. *Applied Optics*, 59(26), 7900-7906.

are similar to those found in cell phone cameras. Material for this chapter was derived from a popular short course I taught for a professional society over a period of about 10 years, and it drew on the experience I received working for IBM and my first several years working as faculty at the University of Arizona.

12. One significant accomplishment I have achieved through my research is breaking the "diffraction barrier" by applying the techniques of near-field scanning optical microscopy (NSOM),[4] developing specialized near-field probes,[5] and applying the solid immersion lens (SIL) in various ways.[6] This work led me to develop new, more efficient miniature optical probes and high-

[4] Kann, J.L., Milster, T.D., Froehlich, F.F., Ziolkowski, R.W., & Judkins, J.B. (1995). Linear behavior of a near-field optical scanning system. JOSA A, 12(8), 1677-1682; Foehlich, F.F., & Milster, T.D. (1995). Detection of probe dither motion in near-field scanning optical microscopy. Applied optics, 34(31), 7273-7279.

[5] Hirota, K., Milster, T. D., Zhang, Y., & Erwin, J. K. (2000). Design of a near-field probe for optical recording using a 3-dimensional finite difference time domain method. *Japanese Journal of Applied Physics*, *39*(2S), 973.

[6] Shimura, K., Milster, T. D., Jo, J. S., & Hirota, K. (2000). Pupil plane filtering for optical pickup heads with effective numerical aperture of 1.1 and 2.0. *Japanese Journal of Applied Physics*, *39*(2S), 897; Zhang, J., Kim, Y., Kim, Y., Valencia, R., Milster, T. D., & Dozer, D. (2009). High resolution semiconductor inspection by using solid immersion lenses. *Japanese Journal of Applied Physics*, *48*(3S1), 03A043.

performance miniature optical systems.[7] In these projects, my students and I applied a mixture of theory, optical design and fabrication techniques to produce real examples of the miniature and micro-optical lenses that we envisioned. One of my recent conference presentations entitled "Practical measurement of cell-phone camera focal length," specifically addresses the properties of modern cell-phone camera lenses.[8]

13. One of my current projects is directly related to molding optical elements. A recent paper entitled "Precision glass molding of diffractive op- tical elements with high surface quality" specifically addresses issues for molding small glass structures.[9] My students, staff and I developed a complete process for molding glass structures with micrometer-size structures and extremely high quality. Although not mentioned in the publication, we also worked on

[7] Zhang, Y., Milster, T. D., Kim, J. S., & Park, S. K. (2004). Advanced lens design for bit-wise volumetric optical data storage. *Japanese journal of applied physics*, *43*(7S), 4929.

[8] Milster, T. D., & Kuhn, W. P. (2020, August). Practical measurement of cell-phone camera lens focal length. In *Optical System Alignment, Tolerancing, and Verification XIII* (Vol. 11488, p. 1148807). International Society for Optics and Photonics.

[9] Zhang, Y., Liang, R., Spires, O. J., Yin, S., Yi, A., & Milster, T. D. (2020). Precision glass molding of diffractive optical elements with high surface quality. *Optics Letters*, *45*(23), 6438-6441.

molding plastic lens structures. This experience relates directly to the fabrication of miniature optical components, like those under review for this case.

14. I am a Fellow member of the Optical Society of America and the SPIE – International Society for Optics and Photonics. I am also a Senior Member of the National Association of Inventors.

15. In addition to my research, I have served as a technical expert in both district courts and ITC patent litigation in the United States of America. In the last ten years, I have testified in the following matters: *American Medical Systems, Inc.* and *Laserscope v. Laser Peripherals, LLC*, Civil Action No.

16. 08-CV-4798, United States District Court for the District of Minnesota; American Medical Systems, Inc. and Laserscope v. Biolitec, Inc., Biolitec AG, Biolitec SIA, Ceramoptec Industries, Inc., Ceramoptec GmbH and Andaoptec, LTD, Civil Action No. 3:08-CV-30061-MAP, United States District Court for the District of Massachusetts, as well in an arbitration matter between Corephotonics Ltd. and Ningbo Sunny Opotech Co., Ltd., Case No. HKIAC/A19025.

17. A copy of my CV further describing my experience is attached as exhibit 2002.

IV. LEVEL OF ORDINARY SKILL IN THE ART (POSITA)

18. I understand that in evaluating the validity of the '277 patent claims, the content of a patent or printed publication prior art should be interpreted the way a person of ordinary skill in the art would have interpreted the prior art as of the effective filing date of the challenged patent.

19. I understand that factors that may be considered in determining the level of ordinary skill in the art at the time of the effective filing date of the challenged patents include: (1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.

20. Dr. Sasián at ¶19 in each declaration believes "that a person having ordinary skill in the art ("POSITA") would include someone who had, at the priority date of the '277 patent, (i) a Bachelor's degree in Physics, Optical Sciences, or equivalent training, as well as (ii) approximately three years of experience in designing multi-lens optical systems. Such a person would have had experience in analyzing, tolerancing, adjusting, and optimizing multi-lens systems for manufacturing, and would have been familiar with the specifications of lens systems. In addition, a POSITA would have known how to use

lens design software such as Code V, Oslo, or Zemax, and would have taken a lens design course or had equivalent training. I have applied the same definition of a POSITA in this declaration.

21. I understand that this means that the material disclosed in the specification of the '277 patent was also contained in the January 30, 2017 patent application that led to the '568 patent.

22. I understand that the '277 patent shares a specification with and claims priority to U.S. App. No. 15/418,925 filed on Jan. 30, 2017, and issued as U.S. Patent No. 9,857,568, which is a continuation-in-part of U.S. App. No. 15/170,472 filed on Jun. 1, 2016, and issued as U.S. Patent No. 9,568,712, which is a continuation of U.S. App. No. 14/932,319 filed Nov. 4, 2015, and issued as U.S. Patent No. 9,402,032, which is a continuation of U.S. App. No. 14/367,924 filed on Jun. 22, 2014, now abandoned. (Ex. 1001, '277 patent at 1:6–15.) I understand that U.S. App. No. 14/367,924 was a § 371 application from international patent application PCT/IB2014/062465 filed June 20, 2014 and is related to and claims priority from U.S. Provision Patent Application No. 61/842,987 filed July 4, 2013. (Ex. 1001, '277 patent at 1:14–21.)

23. I understand that the '277 patent also claims priority by a series of continuations and continuations-in-part to a provisional patent application that

was filed on July 4, 2013. (Ex. 1001, '277 patent at 1:5–21.) I understand that this means that portions of the '277 patent specification were disclosed in the July 4, 2013 provisional patent application, while other portions may have been added in the January 30, 2017 application leading to the '568 patent.

24. I understand that a claim of the '277 patent is entitled to July 4, 2013 effective filing date if there is a written description in that provisional application that demonstrates that the inventors had possession of the invention recited in the claim at the time the July 4, 2013 application was filed. I understand that if there is not sufficient written description to demonstrate possession of the invention recited in the claim, then that claim is entitled to the January 30, 2017 effective filing date.

25. Dr. Sasián applies July 4, 2013, the earliest alleged priority date, as the priority date for claims 1-24. Ex. 1003, Sasián Decl. at ¶ 21. My opinions in reply to Dr. Sasián also use these priority dates. I would have met the requirements of a POSITA on June 13, 2013. I have used the perspective of a POSITA at that time to form my opinions in reply to Dr. Sasián's opinions.